

REMARKS

Applicants present claims 29 and 30 for examination.

Withdrawn method claims 23-26 including independent claims 23 and 25 include all of the limitations of amended claim 8. Rejoinder pursuant to MPEP §821.04 is respectfully requested upon allowance of corresponding product claim 8 directed to a spark plug.

Review and reconsideration on the merits are requested.

Claims 1-15 and 21 were rejected under 35 U.S.C. § 112, first paragraph. The Examiner considered the descriptions “unfused” igniter section and “fused” weldment section as introducing new matter and as not finding written description support in the specification as originally filed.

In this regard, the Examiner did not consider the description “not influenced by a composition change” at page 3, line 28 to provide adequate support for the subject limitations. Particularly, the Examiner reasoned that the entire igniter may be fused, yet include a portion containing only the fused noble metal (i.e., a portion or rather igniter section free from the material of the ground or center electrode) and another portion containing the material of the ground or center electrode.

Applicants respectfully traverse for the following reasons.

Fig. 2 of the specification shows first and second chips 31' and 32' constituting first and second igniters 31 and 32, where laser weldments W1 and W2 are formed to provide first and second igniters 31 and 32 (page 8, line 31-page 9, line 11 of the specification). That is, Fig. 2 shows “unfused” igniter sections 31' and 32' as part of igniters 31 and 32 further including a

“fused” weldment section W1 and W2, respectively. The laser weldments W1 and W2 are “solidified” (see page 9, lines 4 and 9) indicating the “fused” nature of the weldment section, whereas Fig. 2 also clearly shows first and second chips 31’ and 32’ being distinct from the “fused” weldment sections W1 and W2. These are the “unfused” igniter sections.

Thus, in view of Fig. 2 and the description at page 9, one skilled in the art would understand that the igniter portions 31’ and 32’ are “unfused” and that weldment sections W1 and W2 are “fused”, and that the present inventors had possession of the subject invention at the time that the application was filed. Withdrawal of the foregoing rejection under 35 U.S.C. § 112, first paragraph, is respectfully requested.

Claims 1-4 and 7 stand rejected under 35 U.S.C. § 102(b) as being anticipated by JP 06-338376 to Mamoru et al (JP ‘376). Claims 5 and 6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over JP ‘376 in view of U.S. Patent 6,215,234 to Abe et al. Claims 8-12, 15 and 21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over JP ‘376 in view of U.S. Patent 6,045,424 to Chang et al. Claims 13 and 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over JP ‘376 in view of Chang et al, further in view of Abe et al.

The grounds for rejection remain the same as set forth in the previous Office Action.

The Examiner cited to JP ‘376 as disclosing an igniter including an igniter section 19 and a weldment section 20, where at least a portion of the igniter section is not blended with the material of the ground electrode. The Examiner reasoned that the igniter section 19 contains only the precious alloy material of the plug 18 even after welding, because JP ‘376 is said to describe portion 19 as being a “precious alloy layer”. Although acknowledging that plug 18

composed of the precious alloy is melted and then solidifies, the Examiner was of the view that the precious alloy is not entirely unified with the ground electrode, because otherwise there would be no need for seam soldering along the perimeter as disclosed in paragraph [0019]. Further in support of her position, the Examiner noted that JP '376 describes a change in composition along the thickness of the ground electrode, as the noble metal content decreases from the precious alloy layer 19 to the ground electrode 21, citing paragraph [0022]. The Examiner concluded that the melted and solidified precious alloy layer 19 is therefore not entirely blended with the material of the ground electrode, and therefore contains at least a portion free of the ground electrode material.

Applicants traverse, and respectfully request the Examiner to reconsider for the following reasons.

In support of the rejection, the Examiner stated that "At least a portion of the igniter section is not blended with the material of the ground electrode, as it contains only the precious alloy material of the plug 18 even after welding, since Mamoru describes portion 19 as a precious alloy layer, which is another term for the precious alloy electrode 13 which may be any of the alloys disclosed in paragraph 0014".

Applicants respectfully disagree with the Examiner's reading of Mamoru et al for the following reasons.

The "Scope of Claim for Patent" of Mamoru et al contains a single claim as follows.

[Claim 1] A spark plug electrode wherein by heating and melting by using welding means an igniting portion of an electrode basic material consisting of a first metallic material provided by using a corrosion-resistant metal and a precious metal material consisting of a second metallic material provided by using a spark

exhaustion-resistant metal, a precious alloy electrode consisting of a melted and solidified precious alloy layer is formed at the igniting portion of the electrode basic material, characterized in that the first metallic material and the second metallic material that form the melted and solidified precious alloy layer are provided by using materials, the sum of gas constituent elements of which are 200 ppm or less by weight.

Paragraph [0012] of Mamoru et al discloses that the ground electrode 4 consists of an L-shaped electrode basic material 11 and a precious alloy electrode 13 which is formed at an igniting portion 12 of the electrode basic material 11 to cooperate with the center electrode 3 to produce therebetween a spark discharge.

Paragraph [0013] discloses the following:

The electrode basic material 11 includes a containing material 14 and a core material 15. The coating material 14 consists of a nickel alloy that is excellent in the heat-resisting property and the corrosion-resisting property. The electrode basic material is welded to the leading end surface of the metallic shell 4 to be supported thereby. For the coating material 14 can be used, for example, Inconel 600, Ni-Mn-Si alloy, Ni-Mn-Si-Cr alloy, Ni-Mn-Si-Cr-Al alloy, etc. The core material 15 consists of a metal having a good heat conductivity, such as copper and silver and is concentrically embedded in the coating material 14.

Paragraph [0014] discloses the following:

The precious alloy electrode 13 is nearly circular disk-shaped and formed integral with the discharge end surface (igniting portion) 12 of the coating material 14 of the electrode basic material 11 and made of Pt or Pt alloy that is excellent in the corrosion resistance and the spark exhaustion resistance. In the meantime, for the precious alloy electrode 13 can be used, for example, Pt, Pt-Ni alloy (Pt alloy containing Ni alloy of the same composition as the coating material 14), Ir, Ir-Ni alloy, Pt-Ir-Ni alloy, etc.

Paragraph [0019] discloses the following:

The precious metal material 18 is fitted in the central portion of the circular groove 17 and temporarily fixed to the surface of the coating material 14 of the electrode basic material 11 by resistant welding. Then, as shown in Fig.

2(b), in the atmosphere of inactive gas (e.g., argon gas), laser beam LB is irradiated vertically against the center of the circular groove 17 (e.g., the laser spot diameter is 1.4 mm) for thereby heating and melting the precious metal material 18 and the coating material 14 of the electrode basic material 11, around the precious metal material 18. At this time, the entire circumference of the precious metal material 18 is seam-welded to the electrode basic material by four laser beams LB.

Paragraph [0021] discloses the following:

When the coating material 14 at the igniting portion 12 of the electrode basic material 11 and the precious metal material 18 are melted by laser welding, the nickel alloy component of the coating material 14 of the electrode basic material 11, which ranges from 0.5 to 80 wt.%, is blended with the precious metal material 18 to form the melted and solidified precious alloy layer 19 at the igniting portion 12 of the electrode basic material 11 after laser welding, as shown in Fig. 2(c).

Paragraph [0022] discloses the following:

In the meantime, between the melted and solidified precious alloy layer 19 and the coating material 14 of the electrode basic material 11 is formed a diffusion alloy portion 20 of the thickness from several to several hundreds μm . The diffusion alloy portion 20 has a larger precious metal content as it is located closer to a base portion 21 and a smaller precious metal content as it goes closer to the coating material 14 of the electrode basic material 11.

The foregoing disclosure of Mamoru et al shows that:

- (1) the ground electrode 4 consists of the coating material 14 and the core material 15; and
- (2) the melted and solidified precious alloy layer 19 consists of the precious metal material 18 and the coating material 14.

In addition, claim 1 of Mamoru et al expressly recites that the first metallic material and the second metallic material form the melted and solidified precious alloy layer.

Accordingly, the Examiner's conclusion that the melted and solidified precious alloy layer 19 contains at least a portion free of the material of the ground electrode is mistaken and there is no basis or grounds in the disclosure of Mamoru et al in support of that conclusion.

Regarding the Examiner's statement that---, since Mamoru describes portion 19 as a "precious alloy layer", which is another term for the precious alloy electrode (13) which may be any of the alloys disclosed in paragraph [0014], Applicants note that the precious alloy electrode (13) cannot be any of the alloys disclosed in paragraph [0014]. This is because during the welding, the alloy forming precious alloy electrode (13) is blended with the coating material 14 to form the melted and solidified precious alloy layer 19.

Regarding the Examiner's statement that "the precious alloy is not entirely unified with the ground electrode material", the pertinent question is not whether the precious alloy electrode is entirely unified with the ground electrode, but rather whether the precious alloy electrode 13 is blended with the materials of the ground electrode 4.

Further regarding the Examiner's statement that "If it were, there would be no need for the seam soldering along the perimeter of the noble-metals material (18), as disclosed by Mamoru et al in paragraph [0019], Applicants note that in addition to seam welding along the perimeter of the precious metal material, laser beam LB is irradiated vertically against the center of the circular groove 17 (e.g., the laser spot diameter is 1.4 mm) to thereby heat and melt the precious metal material 18 and the coating material 14 of the electrode basic material 11, around the precious metal material. Notably, the laser spot diameter of 1.4 mm is twice as large as the diameter of the precious metal material 18 (i.e., 0.7 mm). This surely causes the precious metal

material 18 and the coating material 14 therearound to melt and blend with one another. Further, Applicants note that the entire circumference of the precious metal material 18 is seam-welded to the electrode basic material by four laser beams LB. Accordingly, even if the laser beam LB is irradiated against the boundary between the electrode basic material 11 and the precious metal material 18, the precious metal material 18 that is 0.7 mm in diameter is included entirely within the laser spot diameter (1.4 mm). Namely, the precious metal material 18 is subject to irradiation of the laser beam LB four times at the time of seam welding such that the precious metal material 18 and the coating material 14 assuredly are further melted and blended with each other.

Regarding the Examiner's statement that Mamoru et al discloses a change in composition along the thickness of the ground electrode, as the noble metal content decreases from the precious alloy layer (19) to the ground electrode (21), Applicants note that the diffusion alloy portion 20 is not a portion of the melted and solidified alloy layer 19, but rather is formed independently between the melted and solidified precious alloy layer 19 and the coating material 14. Accordingly, the presence of the melted and solidified precious alloy layer 19 cannot be a basis for determining that the melted and solidified precious alloy layer 19 is not entirely blended with the material of the ground electrode.

Regarding the nickel alloy content in the range of 0.5 to 80.0 wt.%, Applicants are of the opinion that the nickel alloy content in the melted and solidified precious alloy layer 19 varies within the range of 0.5 to 80.0 wt.% but a portion of the melted and solidified precious alloy layer 19 always contains the nickel alloy layer in an amount of at least 0.5 wt.%.

From a different perspective, because layer 19 is formed by melting and solidifying, it is natural that at least some of the ground or center electrode material is introduced into the melted and solidified portion 19. The fact that there is a concentration ingredient in the thickness direction with the noble metal content decreasing towards the ground electrode (paragraph [0022]) does not describe a portion free from the material of the ground or center electrode. To the contrary, a “gradient” indicates that some of the material of the ground or center electrode is present throughout the entire thickness direction of the layer 19. Also, the description of portion 19 as being “a precious alloy layer” does not mean or say that the layer does not contain a minor amount of the material of the center ground electrode. For example, paragraph [0014] describes that the precious alloy electrode 13, can contain nickel (i.e., the precious alloy electrode 13 does not exclude components other than noble metals).

As shown above, there is no disclosure or basis in Mamoru et al for understanding that a portion of the igniter section is not bonded with the material of the ground electrode, and that the melted and solidified pressure alloy layer 19 or precious alloy electrode 13 is not entirely bonded with the material of the ground electrode. To the contrary, the disclosure of Mamoru et al makes clear that the melting and solidified pressure alloy layer 19 consists of the precious metal material 18 and the coating material 14. Thus, the present claims which define the igniter as including an unfused igniter section and a fused weldman section patentably distinguished over Mamoru et al (JP '376), alone or in combination with any of Abe et al and Chang et al, and withdrawal of the foregoing rejections is respectfully requested.

AMENDMENT UNDER 37 C.F.R. §1.111
U.S. Appln. No. 09/893,488

Withdrawal of all rejections and allowance of claims 1-15, 21-26, 29 and 30 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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